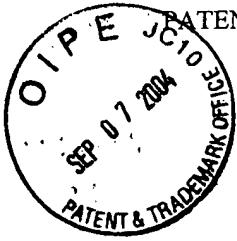


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Attorney Reference Number 4810-56910-01
Application Number 09/733,507
EXPRESS MAIL LABEL NO. EV352377158US
DATE OF DEPOSIT: September 7, 2004



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Wang *et al.*

Application No. 09/733,507

Filed: December 8, 2000

Confirmation No. 2417

For: CYCLIN-DEPENDENT KINASE
INHIBITORS AS PLANT GROWTH
REGULATORS

Examiner: Cynthia E. Collins

Art Unit: 1638

Attorney Reference No. 4810-56910-01

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TRANSMITTAL LETTER

Enclosed for filing in the application referenced above are the following:

- Appellants' Brief under 37 C.F.R. 1.192, with Appendix (in triplicate)
- Appellants hereby petition for an extension of time for two month(s). If an additional extension of time is required, please consider this a petition therefor.
- Check in the amount of \$750 is enclosed to cover:
 - \$330 filing a brief in support of an appeal and
 - \$420 two-month extension of time fee.

TMH/YKH:dv 09/07/04 81601-16
PATENT

Attorney Reference Number 4810-56910-01
Application Number 09/733,507
EXPRESS MAIL LABEL NO. EV352377158US
DATE OF DEPOSIT: September 7, 2004

The Director is hereby authorized to charge any additional fees that may be required, or credit over-payment, to Deposit Account No. 02-4550. A copy of this sheet is enclosed.

Please return the enclosed postcard to confirm that the items listed above have been received.

Respectfully submitted,

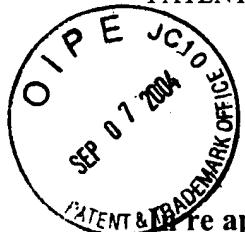
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APPELLANTS' BRIEF UNDER 37 C.F.R. 1.192

The following is the Appellants' Brief, submitted in triplicate and under the provisions of 37 C.F.R. 1.192. The fee of \$330 required by 37 C.F.R. 1.17(c) is enclosed, along with any extension fees that may be required. If the Commissioner finds that additional fees are required for this filing, deposit account authority is provided on the attached transmittal letter.

Real Party in Interest

The real party in interest are the assignees of record, *i.e.* Her Majesty in Right of Canada as Represented by the Minister of Agriculture and Agrifood Canada, 107 Science Place, Saskatoon, Saskatchewan S7N 0X2, Canada; and The University of Saskatchewan Technologies Inc., Room 304, Kirk Hall, The University of Saskatchewan, 117 Science Place, Saskatoon, Saskatchewan S7N 5C8, Canada; and National Research Council of Canada, 1200 Montreal Road, Ottawa, Ontario K1A 0R6, Canada.

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Related Appeals and Interferences

To the best of Appellants', the Appellants' legal representative, and assignees' knowledge, there are no related appeals or interferences that will directly affect, be directly affected by or have a bearing on the present appeal.

Status of Claims

Claims 10, 16, 17, and 23-26 have been cancelled. The present appeal is directed to claims 1-9, 11-15, 18, 20-22, and 27-33, *i.e.* all of the claims still pending in this application. A copy of the claims on appeal is attached in the Appendix.

Status of Amendments

The Appellants filed an amendment to the claims on August 1, 2003, in reply to the Office Action of June 3, 2003. In a final Office Action dated November 5, 2003, it was stated that the amendment had been entered. In the amendment of August 1, 2003, claims 2 to 5, 13, 15, and 20 were amended. Claims 28-33 were newly added. Claims 10, 16, 17, 19, and 23 to 26 were cancelled. No amendments have been made subsequent to August 1, 2003.

Summary of the Invention

The present invention provides methods for modifying plant or plant cell development using cyclin-dependent kinase (CDK) inhibitors. Development can include a wide variety of biological processes including growth, morphogenesis, multiplication, enlargement, differentiation or maturation of a cell. The methods provided involve transforming a plant cell with a nucleic acid encoding a CDK inhibitor polypeptide, or an anti-sense construct complementary to such a nucleic acid, to produce a transformed plant cell. The transformed plant cell, or the progeny, are grown under conditions where the CDK inhibitor polypeptide or anti-sense construct is expressed in the transformed plant cell or progeny of the transformed plant cell. The growing of the transformed plant cell or progeny of the transformed plant cell may be carried out to produce a transformed plant, and the CDK inhibitor polypeptide, or anti-sense construct may be expressed to modify the development of the transformed plant or progeny

of the transformed plant. Another aspect of the present invention provides transgenic plants comprising an expressible heterologous nucleic acid encoding a CDK inhibitor, wherein the heterologous nucleic acid is introduced into the plant by the disclosed methods. The present invention also provides methods of identifying nucleic acids that encode CDK inhibitors such as nucleic acids homologous to the disclosed inhibitor that are active in plants to modify the growth or development of plants (see pages 6 and 7, lines 3-26).

Issues

1. The first issue at appeal is whether the Examiner erred in rejecting claims 1 to 9, 11 to 15, 18, 20 to 22, 27 and 28 to 33 under 35 U.S.C. § 112, first paragraph, on the basis that the written description requirement has not been fulfilled.

2. The second issue at appeal is whether the Examiner erred in rejecting claims 1 to 9, 11 to 15, 18, 20 to 22, 27, and 28 to 33 under 35 U.S.C. § 112, first paragraph, on the basis that the methods disclosed for modifying development of plant by transforming it with a nucleic acid encoding a plant CDK would not enable the skilled person to use the claimed invention.

3. The third issue at appeal is whether the Examiner erred in rejecting claims 1, 2, 4, 14, 18, 22, 27, and 32 under 35 U.S.C. § 112, second paragraph, on the basis that the indicated terms are indefinite and fail to particularly point out and distinctly claim the subject matter of the invention.

4. The final issue at appeal is whether the Examiner erred in rejecting claims 1, 8, 9, 15, 18, 20, 21, 30, and 32 under 35 U.S.C. § 102(b) as being anticipated by John *et al.*, U.S. Patent No. 5,750,862 (hereafter “John”).

Grouping of the Claims

1. Each of the independent method claims 1, 22, 27, 30, and 32 and the transgenic plant claims 15 and 18 is independently and separately patentable.

2. Each of the dependent method claims 2 to 9, 11 to 14, 28, 29, 31, and 33 is individually and separately patentable.
3. Each of the dependent transgenic plant claims 20 and 21 is individually and separately patentable.
4. None of the claims stand or fall together.

Argument

Issue 1 - Written Description Requirement

The Examiner has rejected claims 1 to 9, 11 to 15, 18, 20 to 22, 27 and 28 to 33 under 35 U.S.C. § 112, first paragraph, on the basis that the written description requirement allegedly has not been fulfilled. The Examiner alleges that the rejected claims contain subject matter that is not described in the specification in such way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention.

As a preliminary matter, Applicants believe that the Examiner has not established a *prima facie* case as required by MPEP § 2163(III)(A), by providing reasons why a skilled person would not recognize that the Applicants had possession of the invention. At most, the Examiner has provided general allegations of unpredictability, which is not sufficient – as stated explicitly in MPEP 2163.04(I). Absent a *prima facie* case, the Examiner has not met the burden in this case to make a rejection of these claims for alleged failure of written description.

In support of the written description rejection, the Examiner cites the Written Description Guidelines (Federal Register, vol. 66. No. 4, January 5, 2001, pages 1099-1111), and asserts that the specification describes a single nucleic acid encoding a plant-cyclin dependent kinase inhibitor polypeptide. Applicants respectfully submit that, although the present claims have been restricted to claiming a single species in response to the Restriction Requirement, a full spectrum

of plant cyclin-dependent kinase inhibitors is in fact disclosed: ICK2, ICN2, ICN6, and ICN7. Furthermore, a consensus sequence is provided in Figure 7. Accordingly, Applicants respectfully submit that the Guidelines do not dictate that the present claims contravene §112.

Applicants note the Guidelines state that, for each claim drawn to a genus, “the written description requirement for a claimed genus may be satisfied through sufficient description of a representative number of species by actual reduction to practice, reduction to drawings, or by disclosure of relevant, identifying characteristics.” It is accordingly clear that an actual reduction to practice of **each and every** species within a claimed genus is not a requirement of the Guidelines. This is made explicitly clear in the materials which accompanied the Guidelines, responding to comments received in response to the draft Guidelines, wherein it is stated (emphasis added) that “The Guidelines have been clarified to state that *describing an actual reduction to practice is one of a number of ways to show possession of the invention.* Description of an actual reduction to practice offers an important ‘safe haven’ that applies to all applications and is *just one of several ways by which an applicant may demonstrate possession of the claimed invention.*”

In the present application, Applicants note that there are sequences provided for a representative number of cyclin-dependent kinase inhibitors, illustrating an actual reduction to practice for each of these CDK inhibitors.

Further, Applicants note that Example 18 in the Training Material that accompany the Guidelines is illustrative of the fact that, where there is an actual reduction to practice of even a single embodiment, a claim which encompasses a relevant genus may nevertheless be fully supported and adequately described.

The fact that not every species within a genus needs to be enumerated is further emphasized in MPEP § 2163(II)(A)(3)(a)(ii), which states that “Description of a representative number of species does not require the description to be of such specificity that it would provide individual support for each species that the genus embraces.”

In the final Office action, the Examiner reiterates the rejection by stating that the disclosed CDK inhibitors were all obtained from only a single plant species (*Arabidopsis thaliana*) and thus do not constitute a representative number of species describing all plant CDK inhibitors. The Examiner is making a *mistake of fact* in alleging that Applicants disclosed CDK inhibitors from only a single plant species. Applicants note that the specification provides nucleic acid and amino acid sequences for a representative number of cyclin-dependent kinase inhibitors from more than one plant species and genus, illustrating an actual reduction to practice for each of these CDK inhibitors. In addition to the CDK inhibitors from *A. thaliana*, the specification (page 35, lines 22 to page 36, line 12) describes that a cDNA clone, CDK11, from *Chenopodium rubrum* was sequenced (SEQ ID NOS: 15 and 16) and demonstrated sequence similarity with other CDK inhibitors (see, table 2, page 36). Additionally, an *Agrobacterium* strain harboring an expression construct of CDK11 was used to transform *Arabidopsis* which resulted in significant morphological changes in plant development in over one third of the transformants. These results were obtained regardless of the fact that *Arabidopsis* and *Chenopodium* are phylogenetically distant species (which is noted in the specification at page 36, lines 4-12).

Applicants' specification contains an explicit description of a representative number of species, and it is clearly not required that Applicants provide "individual support of each species" in the genus. Applicants respectfully submit that the written description requirement for a claimed genus has been fulfilled as the description clearly contains a sufficient description of CDK inhibitors from a representative number of distantly related species (and not a single plant species, as alleged by the Examiner) by actual reduction to practice. Furthermore, the skilled person would recognize from the disclosure that the Applicants were in possession of the claimed genus.

The Examiner further states that the rejected claims recite no structural limitations that identify a CDK inhibitor as ICK1, or as an *Arabidopsis* CDK inhibitor, or as a plant CDK inhibitor, or make reference to the consensus sequence of figure 7. Applicants respectfully

submit that the Examiner has erred is making the above statement as independent claims 1 and 27 specifically are directed to a plant cyclin-dependent kinase inhibitor polypeptide and independent claims 30 and 32 are directed to a nucleic acid encoding an Arabidopsis CDK inhibitor polypeptide. Applicants respectfully submit that in view of the above argument, the written description requirement has been fulfilled.

The Examiner further states that actual reduction to practice has not been met as the specific phenotypic effects of only one plant CDK inhibitor (ICK1) are disclosed. Applicants respectfully submit that the Examiner has made a *mistake of fact* in making the above statement as the specification clearly provides support that various CDK inhibitors from both *Arabidopsis* and *Chenopodium* (*see*, argument above) were used to transform different plant species, *Arabidopsis* and *Brassica* (*see*, specification at pages 33 to 35). Furthermore, different CDK inhibitor constructs combined with the use of different constitutive and tissue specific promoters were shown to have different phenotypic effects on the transformed plants. Applicants respectfully submit that the written description requirement has been fulfilled as the description clearly contains a sufficient description to allow the skilled person to recognize that the Applicants were in possession of the full scope of the claimed invention.

Applicants note that dependent claims 2 to 5, 28 and 29 all specifically recite structural limitations, in that the CDK inhibitor nucleic acid or polypeptide is either ICK1, or is homologous/shares identity with ICK1, or is represented by SEQ ID NOS: 1 or 3 or shares identity with SEQ ID NOS: 1 or 3. Therefore, Applicants submit that the Examiner, at the very least, improperly rejected claims 2 to 5, 28 and 29, as the specification clearly provides support that the Applicants were in possession of the invention as claimed in these claims.

In particular, the Examiner has admitted that there is written descriptive support for modifying plant development using ICK1, and SEQ ID NO: 1. In the Office action mailed on September 10, 2002, the Examiner states (at page 3) that “The specification describes a single a [sic] nucleic acid sequence encoding a plant cyclin-dependent kinase inhibitor polypeptide that functions to modify development when expressed in a transformed plant, a nucleic acid of SEQ

ID NO: 1 encoding the *Arabidopsis* cyclin-dependent kinase inhibitor polypeptide ICK1.” Thus, it appears clear that the Examiner has acknowledged that claims 3 and 5, which are each limited to ICK1, meet the written description requirement. As to these claims at least, this rejection should be withdrawn.

Similarly, SEQ ID NO: 3 is clearly described in the specification. Claims 29 and 33 are limited to use of SEQ ID NO: 1 (acknowledged by the Examiner to be adequately described) or SEQ ID NO: 3 to modify development or floral development of a plant. Applicants respectfully request that these claims also meet the requirements for written description, and request that the rejection be withdrawn.

Issue 2

This second issue at appeal is whether the Examiner erred in rejecting claims 1 to 9, 11 to 15, 18, 20 to 22, 27 and 28 to 33 under 35 U.S.C. § 112, first paragraph, alleging that the specification does not reasonably provide enablement to allow the skilled person to make or use the invention commensurate with the scope of the claims.

Specifically, the Examiner states that the disclosure lacks guidance to enable the skilled person to determine which inhibitors to express in a transgenic plant and which promoters to use to drive the expression of the inhibitor to achieve the modification of the plant tissues without exercising undue experimentation. The Examiner also states that, while routine testing would fall within the abilities of the skilled person, the specification has not taught such a person how to discriminate between operative and inoperative embodiments.

Applicants respectfully submit that, although routine assays may be required in order to identify selected optimal embodiments of the claimed invention, no undue experimentation is required to practice the full scope of the invention. Applicants submit that the emphasis in this test is on “undue”, and not on “experimentation” (see *In re Wands*, 858 F.2d 731, 8 USPQ2d 1400, at 1404 (Fed. Cir. 1988)).

The Court in *Wands* states: “Enablement is not precluded by the necessity for some experimentation such as routine screening. However, experimentation needed to practice the invention must not be undue experimentation. The key word is ‘undue,’ not ‘experimentation.’” (*Wands*, 8 USPQ2d 1404). Clearly, enablement of a claimed invention cannot be predicated on the basis of quantity of experimentation required to make or use the invention. “Whether undue experimentation is needed is not a single, simple factual determination, but rather a conclusion reached by weighing many factual considerations.” (*Wands*, 8 USPQ2d 1404). The factors to be considered in determining whether undue experimentation is required include: (1) the quantity of experimentation necessary, (2) the amount or direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims. In the instant case, an analysis of several of these *Wands* factors supports Applicants’ view that undue experimentation is not required to make and the claimed invention to its full scope; specific factors are discussed below.

As the Examiner is no doubt aware, the determination of what is meant by “undue experimentation” has been further characterized by the Federal Circuit as follows (*Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997)):

[t]he test [for undue experimentation] is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed to enable the determination of how to practice a desired embodiment of the claimed invention.

In the current case, any necessary experimentation is merely routine. The Examiner expressly stated that the “trial and error testing” that could be used in practicing the claimed invention “would employ techniques that are **within the ability of the skilled artisan . . .**” (emphasis added; Office action mailed November 5, 2003, at page 5). It is believed by the Applicants, and apparently acknowledged by the Examiner, that any experimentation is well within the limits set

by the *Genentech* court. The testing is routine, even if in some instances substantial testing would be involved.

With respect to Applicants teaching the skilled person to discriminate between operative and inoperative embodiments, the specification provides what a modification of plant or floral development is considered to be (*see*, tables 1 and 2, pages 30 and 36, respectively) and how to test transformants to determine if modification has been achieved. Transformed plants are scored visually for petal modifications. Basic plant breeding techniques are used to determine if the transformed plants exhibit male sterility. The skilled person could use kinase assays or Northern blotting (page 22) to determine which tissues of the transformed plant express the heterologous CDK inhibitor. Flow cytometry (page 31) is used to determine nuclear ploidy levels in transformed plant tissue. Applicants submit that the specification provides a reasonable amount of guidance with respect to discriminating between operative and inoperative embodiments and enables the skilled person to practice any desired embodiment of the claimed invention.

As discussed above, the specification provides working examples that illustrate the effects of using multiple CDK inhibitors in more than one plant species, which species are phylogenetically diverse. The Examiner has acknowledged that the relative skill of those in the art is high, and that such artisans have the abilities necessary to employ techniques for trial and error testing to determine combinations of plant cyclin-dependent kinase inhibitor, plant promoter, and resultant specific phenotypic effect. The technology is sufficiently predictable and the results sufficiently clear for the skilled artisan to determine, in light of Applicants' teaching, which combinations work for the desired purpose.

Taken together, several *Wands* factors support Applicants' contention that undue experimentation would not be required to practice the claimed invention. Applicants therefore request that this rejection of the claims be withdrawn.

Issue 3

The third issue at appeal is whether the Examiner erred in rejecting claims 1, 2, 4, 14, 18, 22, 27 and 32 under 35 U.S.C. § 112 second paragraph for allegedly reciting indefinite terms as specified below.

Claim 1 is allegedly indefinite in the recitation of “development” of a plant. The term “development” is clearly defined in the specification, *e.g.*, at page 6, lines 4-6. Thus, one of ordinary skill in the art is apprised of the meaning of the term in the context of the claim, and the scope of the claim is not rendered unclear by this clearly defined term. Thus Applicants request that the rejection be withdrawn.

Claims 1, 18, 22, 27 and 32 are allegedly indefinite in the recitation of “a differentiated tissue”. The Examiner recognizes that “any mature plant tissue, such as [but not limited to] leaf tissue, stem tissue, floral tissue, root tissue, etc,” can be a differentiated tissue. Each of these types of differentiated tissues and all differentiated plant tissues are contemplated by the term. One of ordinary skill in the art would easily recognize a differentiated tissue in a plant. The Examiner is respectfully reminded that “[b]readth of a claim is not to be equated with indefiniteness” (MPEP §2173.04).

Claim 2 is allegedly indefinite for the recitation of “homologous to”. The phrase “homologous to” is clearly defined in the specification, *e.g.*, at page 2, line 28 through page 15, line 21. Thus, one of ordinary skill in the art is apprised of the meaning of the term in the context of the claim, and the scope of the claim is not rendered unclear by this clearly defined term. Thus, Applicants request that the rejection be withdrawn.

Claim 4 is allegedly indefinite in the recitation of “optimally aligned”. Optimal alignment of sequences is defined in detail in the specification, *e.g.*, at page 13, line 9 through page 14, line 12. Thus, one of ordinary skill in the art is apprised of the meaning of the term in the context of the claims, and the scope of the claim is not rendered unclear by this clearly defined term. Thus, Applicants request that the rejection be withdrawn.

Claim 14 is allegedly indefinite in the recitation of “altered”. The Examiner recognizes that “many different petal characteristics may be altered, such as color, size, shape, number, etc.” Any petal alteration, including those identified by the Examiner, is contemplated by the term. The identification of petal alteration is well within the teaching of the prior art, and the specification clearly provides examples of altered petals, such as reduced-size petals and missing or absent petals (*see, e.g.*, Table 1 or page 35, lines 11-12). A term is not indefinite because it adds breadth to the claim (MPEP §2173.04). Thus, Applicants request that the rejection be withdrawn.

Claim 27 is allegedly indefinite in the recitation of “to change the ploidy”. The Examiner recognizes that “different types of ploidy are possible, such as hyperploidy, hypoploidy, aneuploidy, etc.” Any aneuploidy (including hyperploidy and hypoploidy) is contemplated by the phrase “to change the ploidy”. In any event, the determination of a change in ploidy is well within the teaching of the prior art, and the specification clearly provides examples of transformed plants having changed ploidy (*see, e.g.*, page 31, line 27 through page 33, line 6). Thus, Applicants request that the rejection be withdrawn.

Claim 32 is allegedly indefinite in the recitation of “decreases the ploidy”. The Examiner asserts that this is a relative term that lacks a comparative basis. As argued above with respect to the use of the phrase “to change the ploidy”, Applicants submit that “decreases ploidy” is also definite and one skilled in the art would understand what a decrease in ploidy is in view of the specification. Thus, Applicants request that the rejection be withdrawn.

Issue 4

The final issue at appeal is whether the Examiner erred in rejecting claims 1, 8 , 9, 15, 18, 20, 21, 30 and 32 under 35 U.S.C. § 102(b) as being anticipated by John *et al.*, U.S. Patent No. 5,750,862 (hereafter “John”).

John is cited by the Examiner as teaching a method of modifying development of plants by transforming a plant with a heterologous nucleic acid encoding the cyclin-dependent kinase inhibitors WEE-1 or MIK1 (referring to column 2, lines 1-7, lines 26-30, lines 54-64; column 3, lines 28-32; column 4, lines 32 and 41-65). Applicants note that in column 4, lines 57-58, the cited patent identifies the WEE-1 and MIK1 genes as being from the fission yeast. The Examiner asserts that the yeast WEE-1 or MIK-1 polypeptide would inhibit a plant CDK. Applicants submit that there is no evidence to support the Examiner's assertion and furthermore, the sequences of the yeast CDK inhibitors lack the requisite homology with the plant CDK inhibitor consensus sequence. Accordingly, these are not plant CDK inhibitors, and the reference cannot anticipate the present claims. Therefore, Applicants request that the rejection be withdrawn.

Summary

For the foregoing reasons, it is submitted that the Examiner's rejections are erroneous and reversal of his decision is respectfully requested.

Respectfully submitted,
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APPENDIX

1. A method of modifying development of a plant comprising transforming a plant cell with a nucleic acid encoding a plant cyclin-dependent kinase inhibitor polypeptide to produce a transformed plant cell; and, growing the transformed plant cell or progeny of the transformed plant cell to produce a transformed plant under conditions wherein the plant cyclin-dependent kinase inhibitor polypeptide is expressed in a proliferative tissue of the transformed plant to inhibit development of a differentiated tissue in the plant.
2. The method of claim 1, wherein the nucleic acid encoding the cyclin-dependent kinase inhibitor is homologous to ICK1.
~~3.~~
3. The method of claim 1, wherein the nucleic acid encoding the cyclin-dependent kinase inhibitor is ICK1.
4. The method of claim 1, wherein the cyclin-dependent kinase inhibitor polypeptide is at least 70% identical, when optimally aligned, to ICK1.
5. The method of claim 1, wherein the cyclin-dependent kinase inhibitor polypeptide is ICK1.
6. The method of claim 1, wherein the plant is a member of the *Cruciferae* family.
7. The method of claim 1, wherein the plant is a member of the *Brassica* genus.
8. The method of claim 1, wherein the nucleic acid encoding the cyclin-dependent kinase inhibitor polypeptide is operably linked to a constitutive promoter.

9. The method of claim 1, wherein the nucleic acid encoding the cyclin-dependent kinase inhibitor polypeptide is operably linked to a tissue-specific promoter.

10. (cancelled).

11. The method of claim 9, wherein the tissue-specific promoter is the AP3 promoter.

12. The method of claim 9, wherein the tissue-specific promoter mediates expression of the nucleic acid encoding the cyclin-dependent kinase inhibitor polypeptide in petal or stamen primordia.

13. The method of claim 1 wherein modifying development of the plant makes the plant male sterile.

14. The method of claim 1 wherein the development of the tissue in the plant is modified so that petals on the transformed plant are altered or absent.

15. A transgenic plant comprising an expressible heterologous nucleic acid encoding a cyclin-dependent kinase inhibitor polypeptide capable of inhibiting a cyclin-dependent kinase.

16. (cancelled)

17. (cancelled)

18. A transgenic plant having a recombinant genome comprising a heterologous nucleic acid encoding a cyclin-dependent kinase inhibitor that is expressed in a proliferative tissue of the transformed plant to inhibit development of a differentiated tissue in the plant.

19. (cancelled)

20. A transgenic plant tissue obtained from the transgenic plant of claim 18.

21. The plant tissue of claim 20 wherein the tissue is selected from the group consisting of a seed and a flower.

22. A method of growing the transgenic plant of claim 18, comprising growing the plant under conditions so that the cyclin-dependent kinase inhibitor polypeptide is expressed in a proliferative tissue of the transformed plant to inhibit development of a differentiated tissue in the plant.

23. through 26. (cancelled)

27. A method of modifying development of a plant comprising transforming a plant cell with a nucleic acid encoding a plant cyclin-dependent kinase inhibitor polypeptide to produce a transformed plant cell; and, growing the transformed plant cell or progeny of the transformed plant cell to produce a transformed plant under conditions wherein the plant cyclin-dependent kinase inhibitor polypeptide is expressed in a proliferative tissue of the transformed plant to change the ploidy of a differentiated tissue in the plant.

28. The method of claim 1, wherein the nucleic acid encoding the cyclin-dependent kinase inhibitor comprises:

- a nucleic acid sequence as set forth in SEQ ID NO: 1;
- a nucleic acid sequence as set forth in SEQ ID NO: 3; or
- a nucleic acid sequence having at least 95% sequence identity with a nucleic acid sequence set forth in SEQ ID NO: 1 or SEQ ID NO: 3.

29. The method of claim 1, wherein the nucleic acid encoding the cyclin-dependent kinase inhibitor comprises a nucleic acid sequence as set forth in SEQ ID NO: 1 or 3.

30. A method of modifying floral development of a plant, comprising

transforming a plant cell with a nucleic acid encoding an *Arabidopsis* cyclin-dependent kinase inhibitor polypeptide to produce a transformed plant cell; and

growing the transformed plant cell or progeny of the transformed plant cell to produce a transformed plant,

wherein the plant cyclin-dependent kinase inhibitor polypeptide is expressed in petal or stamen primordia of the transformed plant to inhibit floral development.

31. The method of claim 30, wherein the *Arabidopsis* cyclin-dependent kinase inhibitor polypeptide is encoded by a nucleic acid comprising:

a nucleic acid sequence as set forth in SEQ ID NO: 1;

a nucleic acid sequence as set forth in SEQ ID NO: 3; or

a nucleic acid sequence having at least 95% sequence identity with a nucleic acid sequence set forth in SEQ ID NO: 1 or SEQ ID NO: 3.

32. A method of modifying development of a plant, comprising:

transforming a plant cell with a nucleic acid encoding an *Arabidopsis* cyclin-dependent kinase inhibitor polypeptide to produce a transformed plant cell; and

growing the transformed plant cell or progeny of the transformed plant cell to produce a transformed plant,

wherein expression of the plant cyclin-dependent kinase inhibitor polypeptide decreases ploidy of a differentiated tissue in the plant.

33. The method of claim 32, wherein the *Arabidopsis* cyclin-dependent kinase inhibitor polypeptide is encoded by a nucleic acid comprising:

a nucleic acid sequence as set forth in SEQ ID NO: 1;

a nucleic acid sequence as set forth in SEQ ID NO: 3; or

a nucleic acid sequence having at least 95% sequence identity with a nucleic acid sequence set forth in SEQ ID NO: 1 or SEQ ID NO: 3.